

**REMARKS**

Applicant thanks the Examiner for considering the references cited with the Information Disclosure Statements filed June 23, 2000, November 28, 2000 and April 10, 2001.

**Status of the Application**

Claims 1-6 are all the claims pending in the Application, as claim 6 is newly added to more fully define the current invention. Claims 1, 2 and 4 have been rejected.

**Allowable Subject Matter**

Applicant thanks the Examiner for indicating that claims 3 and 5 are allowed.

**Obviousness Rejection of Claims 1 and 2 Under 35 U.S.C. § 103(a)**

The Examiner has rejected claims 1 and 2 under 35 U.S.C. § 103(a) as being unpatentable over Fukuyo et al. (EP 0 818 805 A2; hereinafter "Fukuyo") in view of Masashi (JP 07-226185; hereinafter "Masashi").

As an initial matter, Applicants respectfully submit that the Examiner's rejection of claim 2 is in error, as the July 19, 2002 Amendment makes claim 2 dependent from claim 3. Thus, as claim 3 has been indicated as being allowed, claim 2 should also be allowable.

Regarding the applied references, Fukuyo discloses (see FIG. 1) arc tube 10, comprised of bulb 12, pinch seal portions 13, tungsten electrode rods 6, molybdenum foil 7 and molybdenum lead wires 8.

Masashi discloses (see FIG. 5) luminescent sphere V comprised of bulb 5 with tungsten rods 1 and 6. Emitter material 10 is provided in rod 1, and nickel rods 8 and 9 secure rods 1 and 6 to bulb 5. Tungsten rod 1 is polished so as to have a surface roughness of 3-10  $\mu\text{m}$ , which enables emitter material 10 to be attached to the end of the rod 1 without creating any special U

or V-shapes in rod 1 (prg 0004). A surface roughness less than 3  $\mu\text{m}$  is disclosed as inadequate for attachment of the emitter material 10, and a roughness greater than 10  $\mu\text{m}$  is inadequate to provide an airtight connection (prg. 0010).

Claim 1

The Examiner has taken the position that Fukuyo discloses all of the features of claim 1, except for “the average roughness of the surface of each electrode being 3  $\mu\text{m}$  or smaller.”

The Examiner has applied Masashi to attempt to provide such a feature, taking the position that it discloses a tungsten electrode “whose average roughness is 3  $\mu\text{m}$ .” The Examiner alleges that it would have been obvious to modify Fukuyo “by having the average surface roughness of 3  $\mu\text{m}$  as suggested by Masashi for firmly fixing the electrode and simplifying [sic - the] manufacturing process.”

However, Applicants respectfully submit that there would have been no motivation to modify the arc tube of Fukuyo by providing the polished tungsten electrode 1 of Masashi. The basic structure and manufacturing process used to create these devices are completely different, and the Examiner has not explained how the electrode of Masashi could improve or simplify any of the processes disclosed in Fukuyo.

Specifically, Fukuyo discloses the specialized pinch-sealed arc tube discussed above. In contrast, Masashi discloses a radically different bulb that is not pinch-sealed, but rather has electrode 1 fixed to the bulb via rod 9, which allows the electrode 1 to extend into the bulb so as to provide a mounting area for emitter 10.

Further, Applicants respectfully submit that the problem sought to be solved in Masashi, *i.e.*, the elimination of any special shape requirements for electrode 1 to enable mounting of

emitter material 10, is specific to Masashi's structure, and is simply not applicable to the structure of Fukuyo.

In fact. Applicants respectfully submit that no structure comparable to emitter material 10 is provided in Fukuyo, and therefore there is no concern with the attachment of such emitter material. In other words, since there is no emitter material provided in Fukuyo, there is no motivation to modify the electrode 6 in order to mount such emitter material.

Thus, Applicants respectfully request that the Examiner withdraw the rejection.

**Obviousness Rejection of Claim 4 Under 35 U.S.C. § 103(a)**

The Examiner has rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Fukuyo in view of Masashi in further view of Honda et al. (US 6,249,086 B1; hereinafter "Honda").

Fukuyo and Masashi are fully discussed above. Honda seeks to reduce the carbon and/or alumina remaining on surfaces of its electrodes 3 by reducing their surface roughness, thereby helping to eliminate blackening and/or whitening of the inside surfaces of ceramic discharge lamps 1. Although Honda is directed towards ceramic discharge lamps, it notes that blackening can also occur in quartz glass discharge containers such as that of Fukuyo, though to a lesser extent (*see* Col. 2, lines 26-33).

Honda's structure consists of high-pressure ceramic discharge lamp 1 with feeding conductors 2, electrodes 3 and ceramic sealing compound 4. Feeding conductor 2 is comprised of sealing metal portion 2a and anti-halogenation portion 2b. Anti-halogenation portion 2b consists of tungsten rod 2b1, molybdenum rod 2b2, molybdenum coil 2b3 and is welded coaxially to the tip of sealing metal portion 2a. Electrode 3 is made by winding a tungsten wire

around the tip end of the anti-halogenation portion 2b. The electrode is then polished before being sealed in discharge container 1 (see col. 15, line 46 - col. 16, line 26).

The Examiner has taken the position that the combination of Fukuyo and Masashi do not teach or suggest an electrode having an average surface roughness of 2  $\mu\text{m}$  or less. Applicants agree.

In an attempt to cure this deficiency, the Examiner applies Honda, taking the position that it discloses that “the average value of the center line average roughness of the electrode is set to be 1.0  $\mu\text{m}$  or less.” The Examiner alleges that it would have been obvious to modify Fukuyo with the electrode of Honda to improve “the electrode emission characteristics of the electrode.”

However, Applicants respectfully submit that Honda does not teach or suggest that the surface of the electrode “in contact with” (*see* amended claim 1, from which claim 4 depends) the pinch seal portions has an average roughness of “2  $\mu\text{m}$  or smaller,” as recited in claim 4.

In contrast, Honda specifically discloses that only electrodes 3 are polished to the specific roughness values disclosed (*see* col. 16, line 25). There is simply no teaching or suggestion that any other portion of feeding conductor 2 is polished to any specific roughness. Thus, even if Fukuyo could have somehow been modified in view of Honda, Applicants respectfully submit that there would have been no motivation to polish all of electrode 6. Therefore, there would have been no teaching or suggestion of a surface of such an electrode with an average roughness of 2  $\mu\text{m}$  or smaller “in contact with” a pinch seal portion, as recited in claim 4.

Thus, Applicants respectfully request that the Examiner withdraw the rejection.

**Conclusion**

In view of the foregoing, it is respectfully submitted that claims 1-6 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-6.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Please charge any fees which may be required to maintain the pendency of this application, except for the Issue Fee, to our Deposit Account No. 19-4880.

Respectfully submitted,



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**APPENDIX**  
**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

**The claims are amended as follows:**

1. (Amended) An arc tube comprising:

an arc-tube body which incorporates a light-emission tube having a discharge space and pinch seal portions formed on two sides of said discharge space, said tube being made of a quartz glass; and

a pair of tungsten electrodes pinch-sealed to said pinch seal portions, respectively, such that leading ends of said pair of tungsten electrodes project into said discharge space, wherein

average roughness of a surface of each of said tungsten electrodes in contact with said pinch seal portions is 3  $\mu\text{m}$  or smaller.

**Claim 6 is added as a new claim.**